SEATTLE CITY LIGHT WORK ORDER #89-6

1989 AUTUMN MONITORING OF THE GEORGETOWN FLUME

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I. INTRODUCTION

The Georgetown Steam Plant Flume was cleaned in November 1985. In March, 1987, the Boeing Company was given 90-day notice of cancellation of its permit to dispose process cooling water into the flume. The permit was revoked May 22. During April, 1987, Raven Services Corporation undertook a project by authorization of Seattle City Light Work Order #87-5 to determine the extent of polychlorinated biphenyl oil contamination and other tests in the Georgetown Steam Plant drainage ditch and the flume to determine if any contaminants had reentered the system. As a result of that study, some recontamination of the flume system was found to have occurred. Documentation and chronology of the recontamination of the flume system was presented in the report for Work Order #87-10, page 16. After the time of the study, the Boeing company sealed the storm drain spouts and cooling water plumbing that fed its industrial site waters to the flume. A monitoring of the flume was conducted in July, 1988, as authorized by Seattle City Light Work Order #88-12, to reassess the extent of PCB contamination. Further quarterly monitoring will ensue as authorized by this present work order. The monitoring in April is covered in the June report for Seattle City Light Work Order #89-6. The summer monitoring was cancelled until the rainy season returned. The autumn monitoring (beginning of rains) took place on 19 September, 1989, and is reported here.

II. SAMPLING METHODOLOGY

A. Container and Sampling Equipment

All samples were placed in 30 ml wide-mouth glass containers that had been precleaned. The screw cap lids were lined with aluminum foil. The precleaning procedure involved scrubbing with a special petrochemical dissolving soap [HarborMaster Products, Inc., Edmonds, Washington]. The terminal end of the brush applied had sufficient bristles to scrub the seam where the side connects with the bottom. A final rinsing with methylene chloride was undertaken to remove any invisible greases and detergent residues.

Scoops and collection pans are laboratory grade stainless steel. Tools were cleaned with the aforementioned detergent and rinsed with methylene chloride. The tools were buffed free of rust before arriving at the site.

B. Field Observations

Data on the collection process and observations of the physical nature of the samples were kept in the bound field log book. The format for this book is chronological.

C. Sampling Strategy

In accordance with EPA SW-846, sampling strategy was chosen from sections most analogous to the nature of the site. These sections are "waste piles" [1.4.3] and "landfills" [1.4.4]. Individual decisions were required for the uneven distribution of the flume sediments. In addition, access to all the sampling areas is somewhat dependent upon where holes occur in the mesh covering at the top of the flume.

D. Sample Collection

Method 8080 in the EPA SW-846 manual describes the protocol for handling of organochlorine pesticides and polychlorinated biphenyls. Compliance with these instructions necessitated using glass containers and specified conditions for refrigeration. All samples in our case were delivered to the laboratory in time to comply with the maximum seven days storage for extraction and thirty days for complete analysis.

The sediments were shallow, and since access to the sample sites was restricted by the wire heavy mesh across the top of the flume, a special device was used in the form of an 8 cm stainless steel spoon bent to a 90° angle and attached to a 1/2" diameter 7' long stainless steel pipe. The spoon was ferreted through holes in the mesh and used as a scoop against the floor of the flume. Compositing was accomplished in a stainless steel 30 cm diameter mixing bowl.

Wood cores were specified for this project. Raven has devised a corer that can sample any of the wood floor locations. The corer consists of a steel punch, 5/8" in diameter and nine feet long. Threads at the bottom of the punch allowed the corer to be screwed out from the planks after it had been hammered in. Sampling locations are shown in the Figure.

E. Analysis

Samples, stored no longer than five days at 4° C, were extracted with methylene chloride and taken up with pesticide grade hexane. Samples were pre-treated with Florisil filters to remove residues that interfere with the PCB determination [cleanup modification of USEPA Method 3540, as specified by 40CFR136]. The samples were analyzed by a modification of the packed column gas chromatography procedure described in Method 3550 using an HP-DB5 column. The gas chromatograph [Hewlett-Packard 5730A] with electron capture detector was used. Concentrations below 0.01 ppm are at the detection limit, but concentrations below 1 ppm are not quantified. QA/QC and raw signal data are available on request.

III. RESULTS

Temperatures, as recorded with the $\pm$0.05° C immersion thermometer, were air - 23.3, water in flume head - 23.4, water at doublepipes head - 23.6. State of the tide was 6.5 ft. referenced to Seattle tides. The flume had been emptying of tidewater since 8:58 a.m. PCB results on Table I show that PCB residues remain in patches of the flume head system, where 10 ppm were found in the flume head sediment (composite of two) and 1.8 ppm were found at the head of the double pipes. Above the tidegates (composite of four subsamples), 0.3 ppm were found. Below the tidegates the concentration was 0.1 ppm. The wood core samples above the Willow St. Bridge were 0.2 and <0.1 ppm respectively.

IV. DISCUSSION

The decrease in PCB concentrations in the flume system over time has been attributed to washing of the sediments by rainfall and redistribution of the sediments by tidal action. These processes seem to continue. The flume head sediment results showed a decrease: 123 ppm in 1987, to 10 ppm in this work.

There appears to be few mechanisms for sediment removal in the flume head, however, and the water above the sediment appears stagnant during dry periods. The flume head will probably continue to contribute small amounts of PCBs to the system. Since the sediments in the flume head are somewhat consolidated, the results may depend upon where the subsamples are acquired if the PCB contamination is patchy.

Near the tide gates, the sediment is reworked by tidal inflows. A large component of this sediment is fill sand from projects along the banks of the flume. The composite concentrations appear to be at or near the detection limit. The tide gates, as water and sediment barriers, do not work very well.

Examination of wood cores started with the Myrtle St. area. The next wood cores will be taken below the tide gates during the December testing phase.

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SAMPLE LISTINGS

TABLE I

Sample #/ # Subsample	Location	PCB Concentration (ppm) SPRING	PCB Concentration (ppm) AUTUMN
GS-1[1] /2	Flume head	28.0	10.0
GS-2 /1	Double pipe head	26.0	1.8
GS-3 /4	Above tidegates	<1.0	0.3
GS-4 /4	Below tidegates	<1.0	<0.1
GS-5 /2	Willow Street Bridge	<1.0	<0.1
GS-6 /wood	Above Willow Street Bridge	----	0.2
GS-7 /wood	Above Willow Street Bridge	----	<0.1

NOTE: The samples are reported as Aroclor 1254.

[1] Samples were numbered GR-* for 1987 and 1988 sampling; subsequently changed to GS-* for 1989.

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SAMPLE DESCRIPTIONS

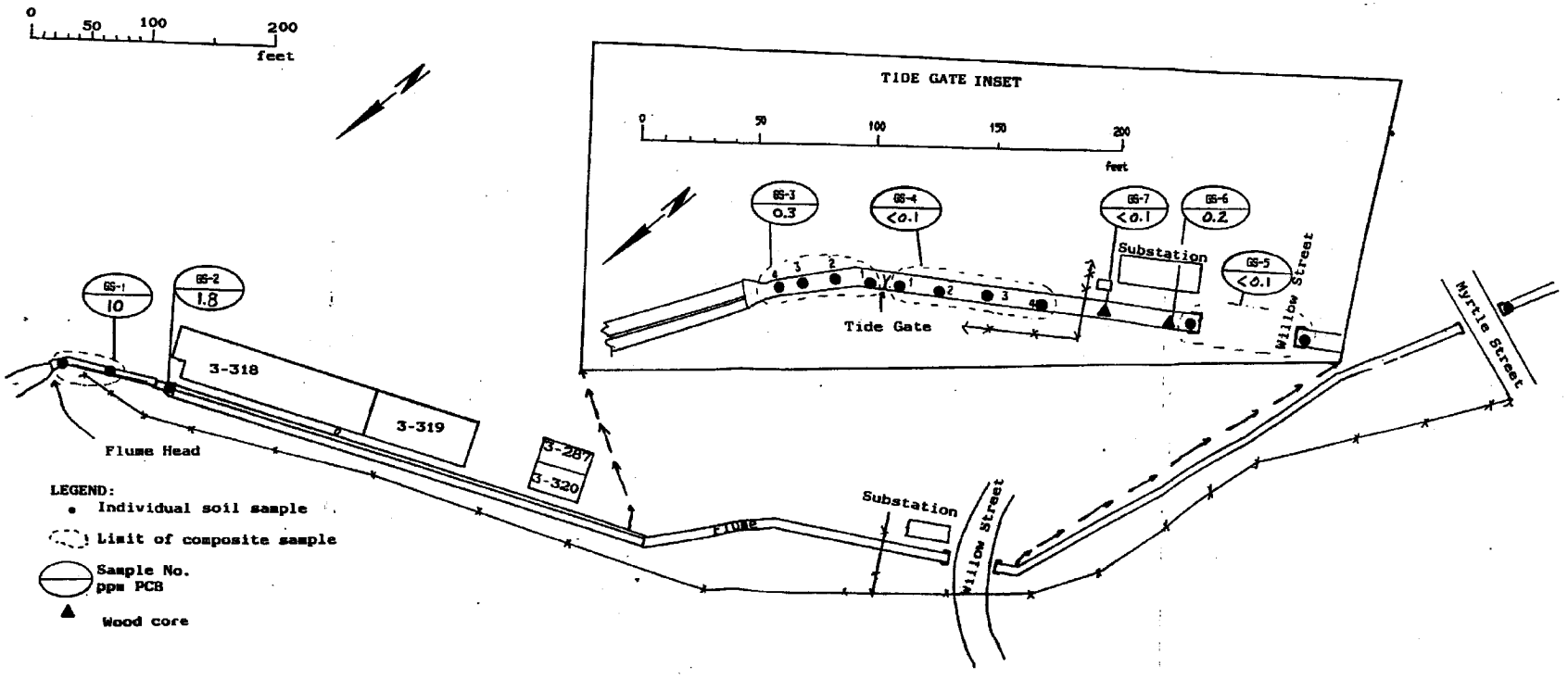
TABLE II

Sample #/ # Subsample	Location	Description
GS-1 /2	Flume head	2" deep sediments under 10" of standing water settled clear. No oil sheen. The first inch was decayed grass in mossy yellow-brown sand. The second inch was oily black sand/silt with odors of hydrogen sulfide
GS-2 /1	Double pipe	1-1/2" deep sediments in shallow pools and patches of stagnant water. Silt with grayish black color and decayed leaves therein.
GS-3 /4	Above tide gate	1" channeled sediments in <1" standing water, patches of bare wood exposed. 1. Coarse, clean sand. 2. Brown silty sand from fill area above flume. 3. Grass/-sand/silt. 4. Silt with live grass.
GS-4 /4	Below tide gate	Bare boards until 15' down-stream of the tide gate. 1,2. 1/4" deep damp sediments of black silt. 3,4. 1/2" deep oily silt and leaf debris.
GS-5 /2	Willow St. Bridge	3/4" black sand topped with yellow-brown silt in 4" of stagnant water. The eastern sample had fresh sand from recent landscaping on the banks.
GS-6 /wood	Above Willow St.	Deteriorated gray wood plank with soft fibers.
GS-7 /wood	Above Willow St.	Newer-looking hard planks.

RAVEN SERVICES CORP.		
SCALE: shown	APPROVED BY: mpH	DRAWN BY LSG
DATE: 30 Oct		REVISED
FLUME		
LA TERRE ENVIRONMENTAL CONS.		DRAWING NUMBER 89-6(2)

SCL GEORGETOWN FLUME SYSTEM

AUTUMN TESTING - 1989



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